Applicant(s):

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method of compressing a lookup table of an apparatus for generating a non-linear function in which a change in gradient is progressively reduced, the method comprising:

separating X-coordinates of the non-linear function into a plurality of sections including steps that have predetermined step sizes;

extracting Y-coordinate values corresponding to X-coordinate values for each step; and

storing the Y-coordinate values in predetermined addresses in a memory,

wherein the step sizes are different according to the sections.

2. (Original) The method of claim 1, wherein each of the plurality of sections includes at least one step.

3. (Original) The method of claim 2, wherein the number of steps of each section is an exponent of 2.

4. (Original) The method of claim 2, wherein the X-coordinate values of the steps included in each of the plurality of sections are represented by binary numbers, and

variable bits that include more than one bit of the binary number of the step are used to calculate step information corresponding to the X-coordinate value within the section including the X-coordinate value.

5. (Original) The method of claim 1, wherein some sections of the plurality of sections include steps having the same step size, and

the other sections of the plurality of sections include steps having different step sizes.

6. (Currently Amended) The method of claim 5, wherein in the other sections, ~~wherein the non-linear function has a change in gradient that is progressively reduced, and,~~ as the change in the gradient of the non-linear function is reduced, the step sizes are increased.

7. (Original) The method of claim 6, wherein the step sizes are increased by an exponent of 2.

8. (Currently Amended) An apparatus for generating a non-linear function in which a change in gradient is progressively reduced, the apparatus comprising:

an analyzer calculating and outputting analysis information including addresses based on an input X-coordinate value;

a memory including a lookup table in which Y-coordinate values corresponding to the X-coordinate values for each step of the non-linear function, the y-coordinate values being separated into a plurality of sections including the steps having predetermined step sizes and being stored in predetermined addresses, the memory outputting the Y-coordinate values corresponding to the addresses; and

a calculator calculating and outputting an approximate Y-coordinate value corresponding to the input X-coordinate value using analysis information and the Y-coordinate values corresponding to the addresses,

wherein the step sizes are different according to the sections, the analysis information includes section information and step information of the section where the input X-coordinate value is included, the step sizes, and an approximate X-coordinate value of the input X-coordinate value, and the addresses include the address of the step in which the input X-coordinate value is included and the address of the subsequent step.

Applicant(s):

9. (Currently Amended) A non-linear function generating method using an apparatus for generating a non-linear function in which a change in gradient is progressively reduced, wherein the apparatus includes a lookup table in which Y-coordinate values corresponding to X-coordinate values of each step of the non-linear function separated into a plurality of sections including steps with predetermined step sizes are stored in predetermined addresses, the method comprising:

calculating section information and step information using an input X-coordinate value;

calculating an address using the section information and the step information;

obtaining a Y-coordinate value corresponding to the address using the lookup table;

calculating an approximate X-coordinate value of the input X-coordinate value using the address;

calculating step size of the corresponding section using the section information; and

calculating and outputting an approximate Y-coordinate value of the Y-coordinate value corresponding to the input X-coordinate value using the approximate X-coordinate value of the X-coordinate, the Y-coordinate value corresponding to the address, and the step size.

10. (Original) The method of claim 9, wherein the X-coordinate values of the steps included in the plurality of sections are represented by binary numbers, and

variable bits including more than one bit of the binary number of the steps are used to calculate the step information corresponding to the X-coordinate value in the section including the X-coordinate value.

11. (Original) The method of claim 9, wherein calculating section information and step information using an input X-coordinate value comprises:

receiving the X-coordinate value having predetermined binary bits;

repeatedly shifting each bit of the X-coordinate value by one bit in a right direction until the shifted X-coordinate value becomes less than a predetermined value and obtaining a final shifted value;

obtaining the section information based on the number of shifts of the X-coordinate value; and

obtaining the step information from the final shifted value.

12. (Original) The method of claim 11, wherein the predetermined value is twice as much as the number of steps included in one section.

13. (Original) The method of claim 11, wherein the section information includes section numbers, and

the step information is the location of the step in the section.

14. (Original) The method of claim 13, wherein calculating an address using the section information and the step information comprises:

repeatedly shifting the binary bits representing the section information by one bit in a left direction for a predetermined number of times; and

adding the step information to the shifted section information to calculate the address.

15. (Original) The method of claim 14, wherein the shifted number is determined by t as a natural number when the number of steps is 2^t.

16. (Original) The method of claim 10, wherein calculating an approximate X-coordinate value of the input X-coordinate value using the address comprises:

obtaining the variable bits from a predetermined lower bit group of the binary number representing the address;

obtaining the section information from a predetermined upper bit group of the binary number representing the address; and

obtaining an approximate X-coordinate value of the X-coordinate from the variable bits according to the section information.

17. (Original) The method of claim 16, wherein the section information includes section orders and section numbers.

18. (Original) The method of claim 17, wherein if the section number is 0, the variable bits are the approximate X-coordinate value of the X-coordinate value, when obtaining an approximate X-coordinate value of the X-coordinate from the variable bits according to the section information.

19. (Original) The method of claim 17, wherein obtaining an approximate X-coordinate value of the X-coordinate from the variable bits according to the section information comprises:

when the section number is other than 0, a logic operation of a predetermined data is performed on the variable bits; and

shifting the logic operated variable bits by a predetermined number in a left direction to obtained the X-coordinate value.

20. (Original) The method of claim 19, wherein the predetermined data is the number of steps in one section.